HydroTherm®

PB
STEAM OR HOT WATER BOILER-BURNER UNIT INSTALLATION & OPERATING INSTRUCTIONS

DESIGNED AND TESTED ACCORDING TO A.S.M.E. BOILER AND PRESSURE VESSEL CODE, SECTION IV FOR A MAXIMUM ALLOWABLE WORKING PRESSURE OF: 15 PSI STEAM OR 40 PSI WATER.

TO INSTALLER
NOTE: READ THESE INSTRUCTIONS CAREFULLY. THEY WILL SAVE YOU VALUABLE TIME WHEN ASSEMBLING THE BOILER.

THESE INSTRUCTIONS TO BE LEFT WITH THE BOILER FOR REFERENCE PURPOSES.

CAUTION: Do not use automotive anti-freeze in boiler waterways. If necessary to use anti-freeze, be sure to employ a preparation designed for hydronic heating systems such as ethylene or propylene glycol.

CONSUMER, RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE PURPOSES.

HydroTherm®

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MADE IN THE USA

CONTENTS

General 2
Codes, Rules and Regulations 2
Boiler Location 2
Chimney and Breeching 3
Combustion and Ventilation 3
Inspection 4
Jacket Assembly 4
Cleanout Cover Plates 4
Boiler Trim ..... (Water) 5, (Steam) 11
Thermostat and Limit Controls ..... (Water) 5, (Steam) 12
Piping Connections ..... (Water) 6, (Steam) 11
Circulators 8
Domestic Hot Water Heaters 9
Filling the System ..... (Water) 8, (Steam) 14
Boiler Maintenance ..... (Water) 9-10, (Steam) 15
Steam Boiler Cable Installation 16
Replacement Parts 19
Start-Up Checklist 21
Burner Specifications 22
Warranty 25

GENERAL

The PB Series boiler-burner unit is a wet-base, vertical flue, low pressure, sectional, cast iron steam or hot water heating boiler. It is rated for natural draft firing with -0.02" WC over the fire draft. Boilers are available as three to six sections in length with burner and controls supplied a completely packaged boiler.

The ports between sections are provided with a special hydronic seal which is resistant to petroleum products. The flue gas seal between sections is accomplished by the use of fiberglass rope rated at 1000°F.

Packaged units are hydrostatically tested for the maximum working pressures.

An insulated metal jacket is furnished to both enhance the units looks and to minimize any heat loss. A full access cleanout cover for cleaning vertical flue passages is on the left hand side of the boiler and is accessible by removing the left hand cleanout access jacket panel.

IMPORTANT - Sufficient clearance between the left side of the boiler and adjacent construction must be provided to ensure proper access when cleaning is required!

CODES, RULES AND REGULATIONS

The installation of the boiler, the burner, wiring, controls and fuel piping must be done in accordance with the requirements of the local authorities having jurisdiction. In the absence of local requirements, the following codes apply:
ANSI/NFPA31 - “Installation of Oil Burning Equipment”
ANSI/NFPA70 - “National Electrical Code”

In Canada the following codes apply:
CSA STD. B149 - Latest Edition.
“Installation Code For Oil Burning Equipment.”
CSA STD. C22.2 No. 0 - Latest Edition.
“General Requirements - Canadian Electrical Code Part II.”

All completed boilers shall satisfactorily pass the hydrostatic tests as prescribed by A.S.M.E., Code Section IV.

1. Steam Boilers – The assembled boiler shall be subjected to a hydrostatic test of not less than 45 psig.

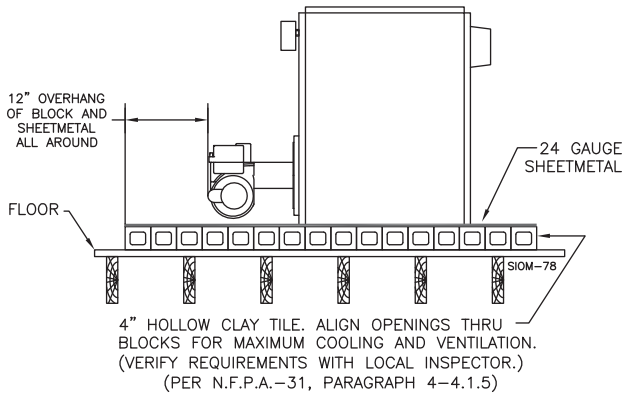
2. Water Boilers – The assembled boiler shall be subjected to a hydrostatic test pressure of 60 psig.

3. The required test shall not exceed the test pressure by more than 10 psig.

BOILER LOCATION

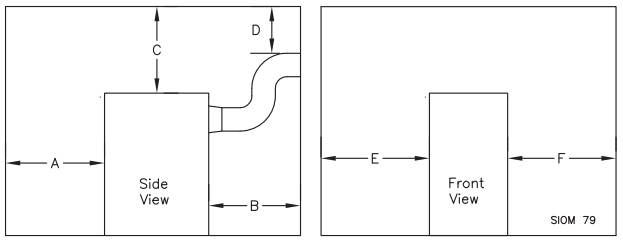
Boiler should be located on a smooth level concrete floor or pad close to the chimney to minimize breeching length. Allow access for boiler cleaning and burner maintenance.

Figure 1A


12" OVERHANG OF BLOCK AND SHEETMETAL ALL AROUND
24 GAUGE SHEETMETAL
FLOOR
SIOM-78
4" HOLLOW CLAY TILE. ALIGN OPENINGS THRU BLOCKS FOR MAXIMUM COOLING AND VENTILATION. (VERIFY REQUIREMENTS WITH LOCAL INSPECTOR.) (PER N.F.P.A.-31, PARAGRAPH 4-4.1.5)

CAUTION - Boiler shall be installed on non-combustible floor only, unless Figure 1A is followed.

Figure 1B



Clearance to Combustibles

Dimension		Minimum Clearance	* Service Clearance
Letter	Description		
A	Front	24"	24"
B	Back	12"	24"
C	Top	6"	24"
D	Flue Pipe	9"	–
E**	Left Side	24"	24"
F	Right Side	12"	24"

SIOM 79

* The Service Clearances listed are only suggested and are not manditory.

** Boiler clean out covers are located on the left side. Additional clearance may be needed for service.

Clearances to oil tanks and other hazardous items will be greater. Consult local codes.

CHIMNEY AND BREECHING

Attach the smoke hood to the back of the boiler using the 4 brass machine screws making sure to install the gasket between the smoke hood and boiler. (Gasket and hardware located in literature bag.) The 3 and 4 section models are equipped with a 6" smoke hood, the 5 and 6 section models with a 7" smoke hood. The boiler must be vented with vent pipe having the same diameter as the smoke hood collar. Place the flue pipe over the smoke hood collar and secure it to the collar with a sheet metal screw.

The flue pipe should be run to the chimney by the most direct route, with the minimum number of elbows and with a slight upward pitch. The pipe should terminate flush with the inside face of the chimney and should be sealed in place with insulating cement. The boiler must be vented to the outdoors by means of a tile lined masonry chimney.

For energy conservation, the boiler can be vented directly into a chimney without the use of a barometric draft control, unless required by code or in instances where the chimney can develop excessive draft. **Overfire** draft greater than -0.05" WC, with the burner in operation, is excessive (normal draft is -0.02 to -0.04" WC).

COMBUSTION AND VENTILATION

Normal residential construction usually allows sufficient air infiltration for combustion. If construction is tight, consideration should be given for air louvers to the outside. Local codes or NFPA 31, “Installation of Oil Burning Equipment”, should be referred to for proper sizing and design and air supply. In Canada refer to CSA STD. B149 - latest edition.

WARNING: This boiler must be connected to a properly sized and constructed chimney or vent system! Failure to comply with this warning can result in a fire which could cause extensive property damage, severe personal injury or death!

INSPECTION

Careful inspection should be made of all assemblies to detect possible damage during shipment. Factory assembled boilers are hydrostatically tested at the factory to insure pressure tightness. Before piping connections are made to the boiler, hydrostatically retest boiler sections to detect leaks that may have developed from rough handling during shipment. (Maximum allowable working pressure of 15 psi steam or 80 psi water)

PACKAGED BOILERS

The "Burner in the Box"

Packaged boilers with "The Burner in the Box" are shipped on a wood skid with tie down bands and a wooden crate enclosing the boiler. The boiler is shipped without the burner being mounted and wired in place. The burner is shipped and inventoried independently of the boiler. Burners from Carlin, Beckett and Riello are available as options. The PB Series boiler is equipped with a universal harness system utilizing a 6-pin electrical connector. The harness system has been designed to allow any of these burners to connect to both steam and water boilers. The harness system is designed to make burner replacement and routine servicing quicker and safer to perform.

Packaged boilers are shipped on a wood skid with tie down bands and a wooden crate enclosing the boiler and burner installed.

Remove the protective crate and skid. Set the boiler in its final location and shim under the feet to make it level and secure. Adjust the jacket for proper alignment and support. Refer to Oil Fired Boiler Electrical Diagrams (PDEWD) for appropriate wiring diagrams.

CLEANOUT COVER PLATE(S)

It is important to maintain the integrity of the gas seal by careful installation of the cleanout cover plate. Be sure there is no opening to allow gases to escape.

WARNING: Never attempt to operate the boiler with the cleanout cover plates removed! Failure to comply with this warning can result in a fire which could cause extensive property damage, severe personal injury or death!

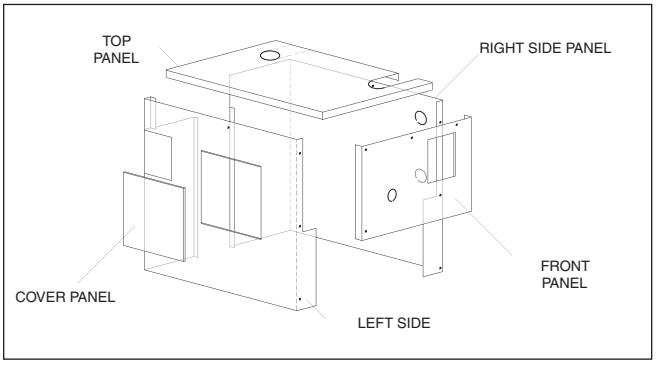
JACKET ASSEMBLY (ASSEMBLED BLOCKS)

Remove all knockouts that are going to interfere with your specific installation arrangement. Install the front panel over the two upper burning mounting plate studs prior to the installation of the burner mounting plate. Fold the right side panel at both the front and rear perforated seams 90° back against the insulation. Slide the front fold under the front panel and secure with philip head screw. Lift side panel up slightly to align the slots in jacket with the bracket holes. Secure with the screws supplied.

Repeat same procedure for the left side panel. Screw the two folds together at the back of the boiler.

Attach the top panel over the edges of all panels and secure. The cleanout cover door attaches to the left side panel by sliding the lower left corner into the slot provided and up over the fold at the top of the opening in the side panel. Slide the cover back toward the rear of the boiler until it makes contact with the back of the slot.

Figure 2 – Jacket Assembly

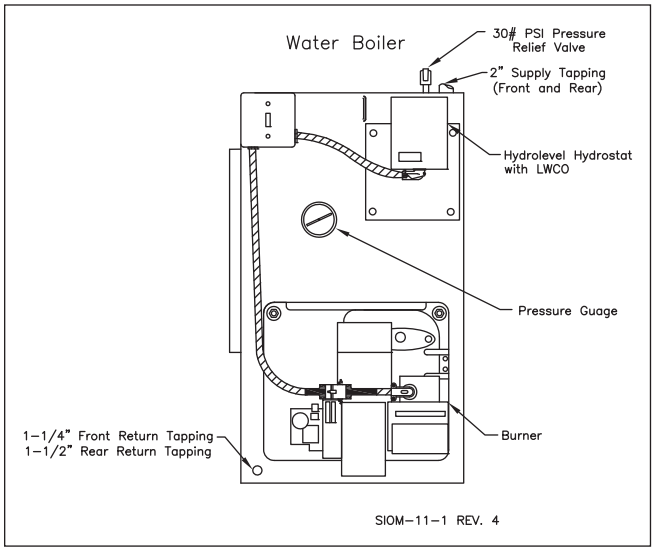


WATER BOILERS

WATER BOILER TRIM

The water trim furnished with the boiler consists of a 2-1/2" round temperature pressure gauge and a 30 psig pressure relief valve. A circulator relay is furnished for installation in the upper port cover plate or the tankless heater cover plate as indicated in Figure No. 3. The installer must furnish and install air removal devices, expansion tank, automatic air vents, make-up water pressure reducing valve, isolating valves and other pipe fittings and equipment necessary for proper operating system.

Figure 3



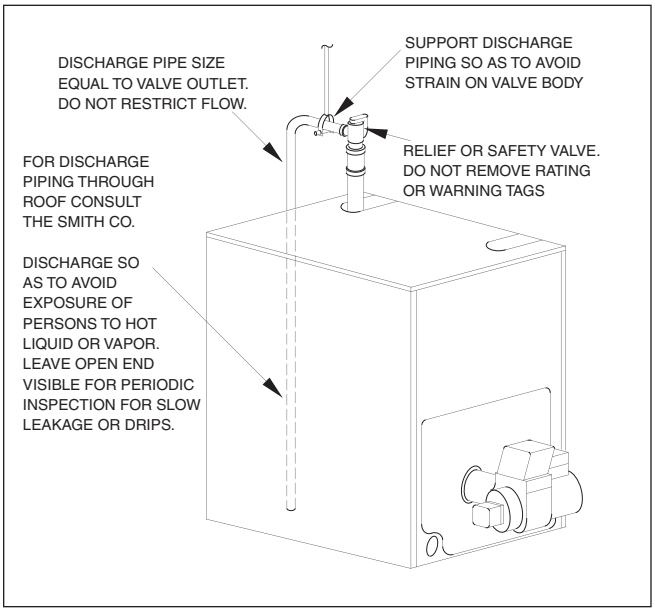
Pressure Relief Valve

Install safety relief valve (30 psi) in top 3/4" tapping of back section.

WARNING: Never install any type of valve between the pressure relief valve and the boiler! Failure to comply with this warning can result in a boiler explosion causing extensive property damage, severe personal injury or death!

WARNING: The pressure relief valve discharge piping must direct all water and vapor away from personnel. Failure to comply with this warning could result in severe personal injury!

Figure 4 – Relief Valve Installation


DISCHARGE PIPE SIZE EQUAL TO VALVE OUTLET. DO NOT RESTRICT FLOW.
SUPPORT DISCHARGE PIPING SO AS TO AVOID STRAIN ON VALVE BODY
RELIEF OR SAFETY VALVE. DO NOT REMOVE RATING OR WARNING TAGS
FOR DISCHARGE PIPING THROUGH ROOF CONSULT THE SMITH CO.
DISCHARGE SO AS TO AVOID EXPOSURE OF PERSONS TO HOT LIQUID OR VAPOR. LEAVE OPEN END VISIBLE FOR PERIODIC INSPECTION FOR SLOW LEAKAGE OR DRIPS.

THERMOSTAT AND LIMIT CONTROLS

Many jurisdictions require dual limit controls. The boiler installer must arrange to comply with local requirements by furnishing and installing any extra controls.

The water boiler is furnished with a Hydrolevel Hydrostat hydronic relay, which provides high limit low limit and circulator switching upon signal from a 24 volt thermostat and LWCO functionality.

PIPING

Pumped Bypass

For these systems that may experience condensation, an additional circulator and balancing valve can be used to provide a return water temperature blend. This method works well with systems with multiple zones with circulators, see Figure 5. The dedicated bypass circulator provides a strong blending flow without diminishing the flow available to any heating zone. Any residentially sized circulator is adequate for this purpose. The balancing valve allows for adjustment of the return temperature (see adjustments procedure in Figure 5).

Pump Away Bypass

For systems that use a single circulator to pump away from the boiler, the bypass should be installed on the discharge side of the circulator, see Figure 6. Full temperature water supplies the baseboard distribution system as before. Half of the circulator's volume moves through the bypass, blending and heating the cooler return water. Again, the cost of installing the bypass is small and setting it by temperature can be accomplished with a contact thermometer (see bypass adjustment procedure Figure 6).

Figure No. 5 – Pumped Bypass

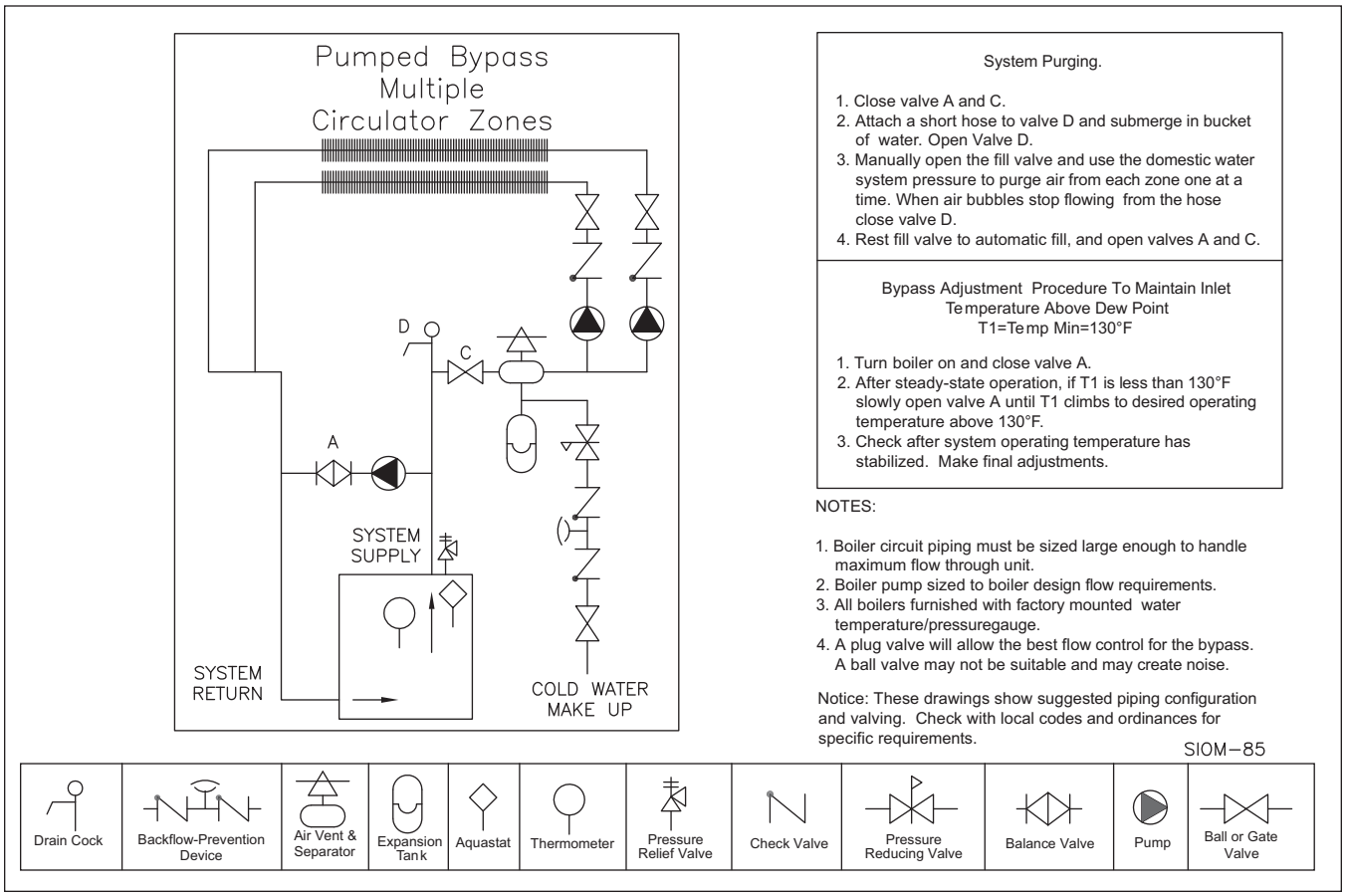
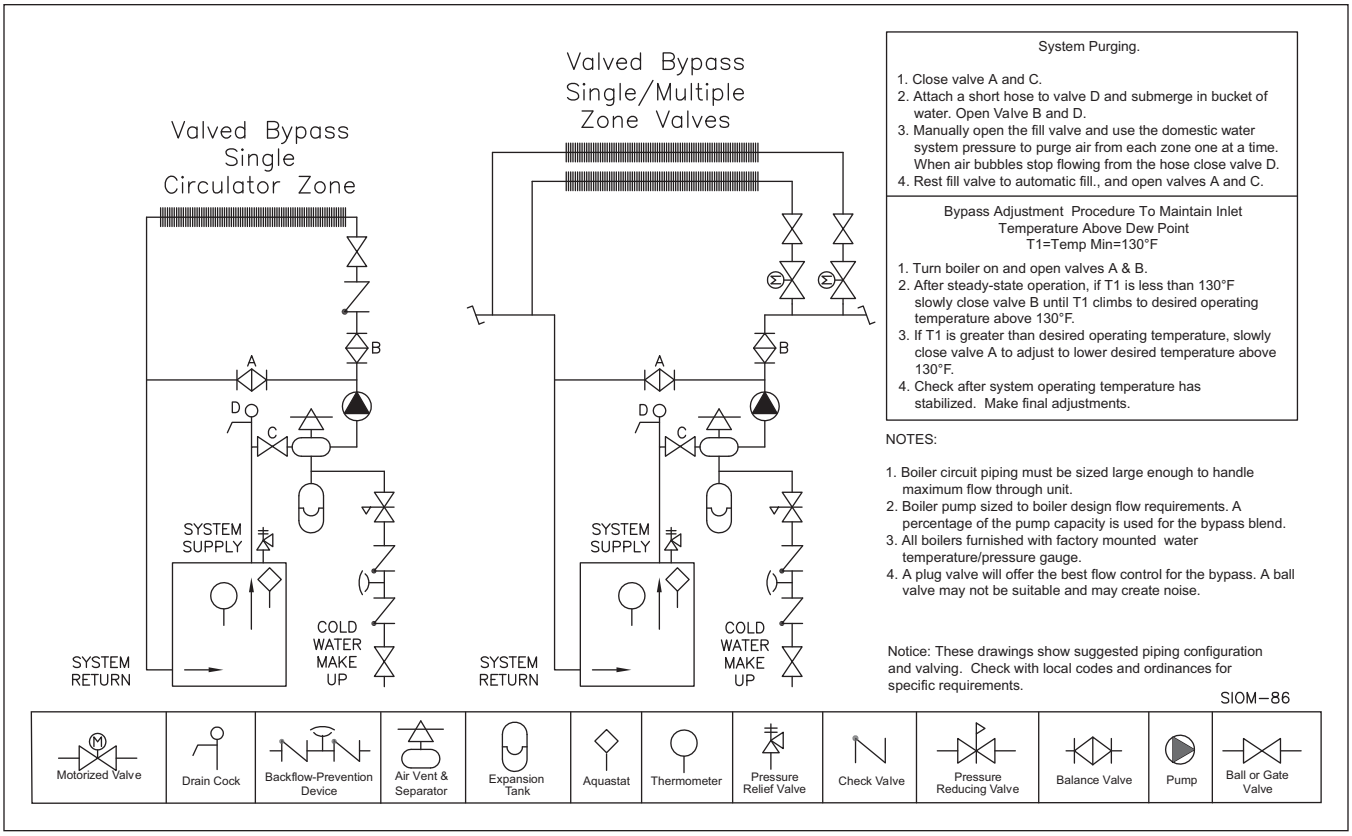

Pumped Bypass
Multiple
Circulator Zones
D
C
A
SYSTEM
SUPPLY
SYSTEM
RETURN
COLD WATER
MAKE UP
System Purging.
1. Close valve A and C.
2. Attach a short hose to valve D and submerge in bucket of water. Open Valve D.
3. Manually open the fill valve and use the domestic water system pressure to purge air from each zone one at a time. When air bubbles stop flowing from the hose close valve D.
4. Rest fill valve to automatic fill, and open valves A and C.
Bypass Adjustment Procedure To Maintain Inlet Temperature Above Dew Point
T1=Temp Min=130°F
1. Turn boiler on and close valve A.
2. After steady-state operation, if T1 is less than 130°F slowly open valve A until T1 climbs to desired operating temperature above 130°F.
3. Check after system operating temperature has stabilized. Make final adjustments.
NOTES:
1. Boiler circuit piping must be sized large enough to handle maximum flow through unit.
2. Boiler pump sized to boiler design flow requirements.
3. All boilers furnished with factory mounted water temperature/pressuregauge.
4. A plug valve will allow the best flow control for the bypass. A ball valve may not be suitable and may create noise.
Notice: These drawings show suggested piping configuration and valving. Check with local codes and ordinances for specific requirements.
SIOM–85
Drain Cock
Backflow-Prevention Device
Air Vent & Separator
Expansion Tank
Aquastat
Thermometer
Pressure Relief Valve
Check Valve
Pressure Reducing Valve
Balance Valve
Pump
Ball or Gate Valve

Figure No. 6 – Pump Away Bypass

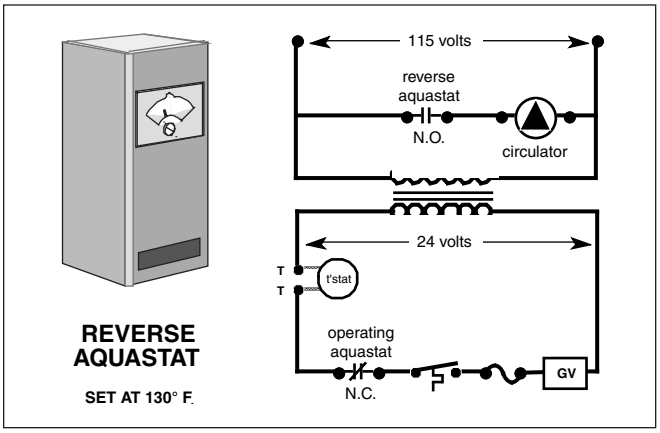

Valved Bypass
Single
Circulator Zone
Valved Bypass
Single/Multiple
Zone Valves
A
B
C
D
SYSTEM
SUPPLY
SYSTEM
RETURN
COLD
WATER
MAKE
UP
System Purging.
1. Close valve A and C.
2. Attach a short hose to valve D and submerge in bucket of water. Open Valve B and D.
3. Manually open the fill valve and use the domestic water system pressure to purge air from each zone one at a time. When air bubbles stop flowing from the hose close valve D.
4. Rest fill valve to automatic fill., and open valves A and C.
Bypass Adjustment Procedure To Maintain Inlet Temperature Above Dew Point
T1=Temp Min=130°F
1. Turn boiler on and open valves A & B.
2. After steady-state operation, if T1 is less than 130°F slowly close valve B until T1 climbs to desired operating temperature above 130°F.
3. If T1 is greater than desired operating temperature, slowly close valve A to adjust to lower desired temperature above 130°F.
4. Check after system operating temperature has stabilized. Make final adjustments.
NOTES:
1. Boiler circuit piping must be sized large enough to handle maximum flow through unit.
2. Boiler pump sized to boiler design flow requirements. A percentage of the pump capacity is used for the bypass blend.
3. All boilers furnished with factory mounted water temperature/pressure gauge.
4. A plug valve will offer the best flow control for the bypass. A ball valve may not be suitable and may create noise.
Notice: These drawings show suggested piping configuration and valving. Check with local codes and ordinances for specific requirements.
SIOM–86
Motorized Valve
Drain Cock
Backflow-Prevention Device
Air Vent & Separator
Expansion Tank
Aquastat
Thermometer
Pressure Relief Valve
Check Valve
Pressure Reducing Valve
Balance Valve
Pump
Ball or Gate Valve

Reverse Acting Aquastats

There is an alternative for existing systems experiencing condensation that does not require re-piping the boiler. It is very effective on single zones high mass systems with large water volumes and cast iron radiation. This option utilizes a reverse acting aquastat, one that makes on temperature rise. Wired in series with the circulator, this control allows the burner to fire while holding the circulator off until the boiler reaches an acceptable temperature. It then starts the system circulation again, see Figure 7.

The most commonly available reverse acting aquastat is a Honeywell L4006B. The aquastat should be mounted in an immersion well directly installed in the boiler. The use of heat conductive grease, Honeywell part #972545, in the immersion well is strongly recommended for fast and accurate temperature response. Set this adjustable aquastat to make at no less than 130°F. While this method can cause the circulator to cycle more frequently, setting the aquastat's differential to the maximum 25-30°F will minimize short cycling.

Figure No. 7 – Reverse Aquastat



Each of these bypass solutions also has the added benefit of increasing circulation in the boiler which will maximize tankless coil output and increase the accuracy of temperature sensing controls.

FILLING THE SYSTEM

Water

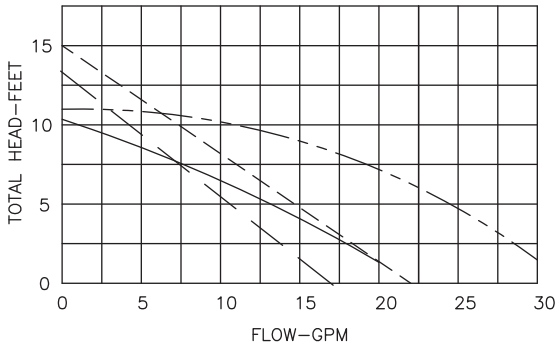
Fill the system slowly, while venting air and checking for leaks. Do not operate the circulator until the system is full. Run the circulator without firing the burner until all air has been bled from the system.

When the relief valve is set to operate at 30 psi, the initial fill pressure should be sufficient to fill the system to the high point and develop a pressure at that point so as to prevent the water in the system from boiling at the maximum operating temperature. Under normal conditions, a static height of 18-1/2' will require an initial fill pressure of 12 psi. If using the suggested piping arrangements, see the system purging instructions with the diagram.

CIRCULATORS

The Taco 007 and 0010 circulators are suitable for use on a closed heating system with 30 psig maximum operating pressure. If a circulator is furnished with the boiler does not have the required capacity to serve the connected load, provide an extra zone circulator or change the circulator to the proper size. Capacity curves for the circulators are provided in these instructions to permit the sizes to be checked with the system requirements.

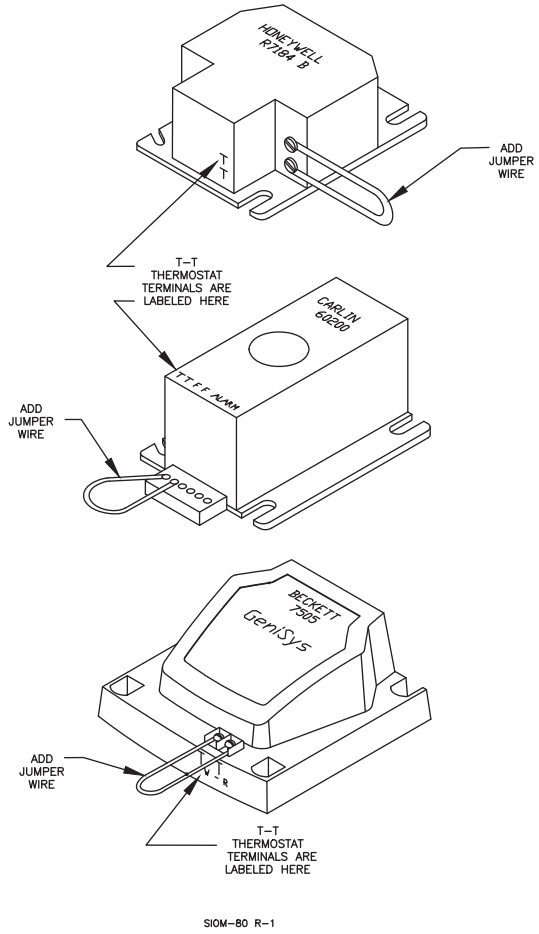
Graph 1



NOTE: The Taco 0010 circulator is rated for 125 psig maximum operating pressure.

A Special Note to Installers of Water Boiler: All Carlin and Beckett burners, shipped separately under the "Burner In The Box" program **do not** have a jumper wire installed on the T-T terminals on the primary ignition control. Water boilers require this jumper in order to operate. On water boilers the thermostat is connected to the aquastat relay, on a steam boiler the thermostat will be connected to the T-T terminals on the primay ignition control (see Figure No. 8).

Figure No. 8



NOTE:
A JUMPER WIRE MUST BE ADDED TO ALL CARLIN AND BECKETT BURNER CONTROLS USED ON WATER BOILERS. FAILURE TO ADD THIS JUMPER WILL RESULT IN AN INCOMPLETE CIRCUIT AND A NO RUN CONDITION.

DOMESTIC HOT WATER HEATERS

Tankless domestic hot water heaters are available for water boiler application.

Figure No. 9 – Tankless Heater

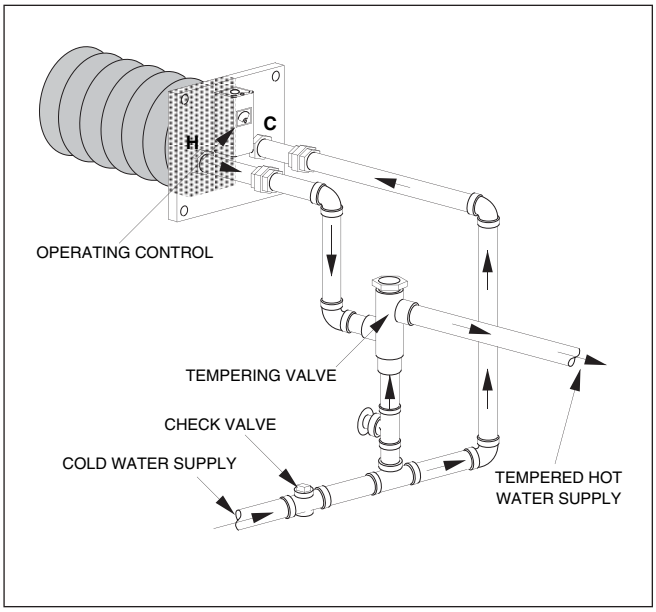


Table 1

DOMESTIC HOT WATER SUPPLY WATER BOILER			
No. of Sections	**Firing Rate**	**Intermittent Draw (GPM)**	**Continuous Draw (GPM)**
3	Low	2.50	1.75
	High	2.50	2.00
4	Low	3.30	2.50
	High	3.30	2.90
5	Low	3.80	3.30
	High	4.50	3.90
6	Low	4.60	4.00
	High	5.00	4.90

40° to 140°F temp. rise at 180°F. boiler water.

WATER BOILER MAINTENANCE

CAUTION: Servicing, inspection and adjustment must be done by a trained technician in accordance with all applicable local and national codes. Improper servicing or adjustment can damage the boiler!

The boiler must be cleaned and inspected at least on a year before each heating season. Make sure that the burner and ignition components are free from dust, soot, dirt, corrosion or other deposits that would impair the boiler's performance.

Safety checks should include, but not limited to, the items listed in the Boiler Safety Checklist. This Safety Checklist is included at the end of the manual. A trained technician with a calibrated combustion analyzer should be hired to test and set up the oil burner to assure maximum safety and efficiency. Consult the manufacturer of each individual safety control for recommendations for service and adjustment.

IMPORTANT - These suggestions cover the boiler maintenance work which will result in the most efficient operation, the longest useful life of the boiler and the highest return on any investment necessary to carry out the maintenance work.

Water Controls

1. WATER PRESSURE: The boiler water pressure must be sufficient to maintain a full system and to prevent boiling of the system water. An initial fill pressure of 12 psi provides for 18-1/2' of system height. Each additional 2.3' of height requires an additional one pound pressure. Be sure no air is trapped in the boiler, system piping or heating units to impede circulation of the heated boiler water.

2. LOW WATER CUTOFF: Check the Hydrolevel Hydrostat control to be certain the switch opens on water level drop below cutoff point.

3. TEMPERATURE CONTROLS: Check regularly to be sure the controls are functioning to prevent excessive high boiler water temperature.

4. RELIEF VALVES: Conduct regular visual inspection of relief valves to detect signs of corrosive deposits, rust buildup or signs of weeping. It should not weep or discharge water at normal system pressure. NEVER try to clean or repair the relief valve! If valve fails replace it! Replace the valve with a new valve of proper capacity and pressure setting if defective.

MAINTENANCE

Heating Surface Cleaning

WARNING: Failure to disconnect all electrical power to the boiler before cleaning it could result in a fire or severe personal burn injuries!

WARNING: Never attempt to operate the boiler with the cleanout cover plate(s) removed! Failure to comply with this warning can result in a fire which could cause extensive property damage, severe personal injury or death!

Disconnect all electrical power to the boiler before proceeding. Remove the cleanout cover access panel from the left side of the boiler. Remove the cleanout cover plate(s) taking care not to damage the insulation between the cover plate(s) and the boiler. Use a wire brush to thoroughly clean the fireside surfaces. For the best results, start brushing from the top and work down toward the combustion chamber. Disconnect the flue pipe and inspect it and the smoke hood for soot build up. Clean them thoroughly before reconnecting them. Open the cleanout door on the right side of the burner mounting plate. Carefully vacuum any soot or scale from the bottom of the combustion chamber. Do not contact the ceramic blanket in the bottom of the combustion chamber or it will be damaged.

IMPORTANT - If the ceramic blanket is damaged it must be replaced! Failure to replace a damaged ceramic blanket can result in the failure of the cast iron sections!

Inspect the cleanout door gasket and insulation and replace them if damaged. Close the cleanout door and tighten it into place. Inspect the cleanout cover insulation and replace it if damaged. **It is important to maintain the integrity of the gas seal by careful installation of the cleanout cover plate. Be sure there is no opening to allow gases to escape.** Install the cleanout cover plate(s) and tighten into place. Install the cleanout cover access panel. Restore electrical power to the boiler and ensure that it operates properly.

Chimney and Smoke Pipe

Be sure that the chimney and smoke pipe do not become obstructed by birds nests, squirrels, soot, chimney liner deterioration, or other debris. Keep chimney cleanout doors closed and sealed tight around the frames. Be sure the smoke pipe is inserted only at the nearest chimney liner surface and seal around the pipe with insulating cement.

WARNING: Be sure that no combustible materials are stored close to the boiler or smoke pipe. Fires can cause personal injury and property damage.

STEAM BOILERS

STEAM BOILER TRIM

The steam trim furnished with the boiler consists of: a 2-1/2" round steam pressure gauge, a Hydrolevel CG450-2060 or a CGT450-2060 probe style low water cut-off, water gauge glass set with gauge cocks, side outlet steam safety valve, and high pressure limit control with siphon, refer to Figure 10 for correct control and trim locations. Pipe fittings required to install trim and controls as shown are furnished.

Figure No. 10

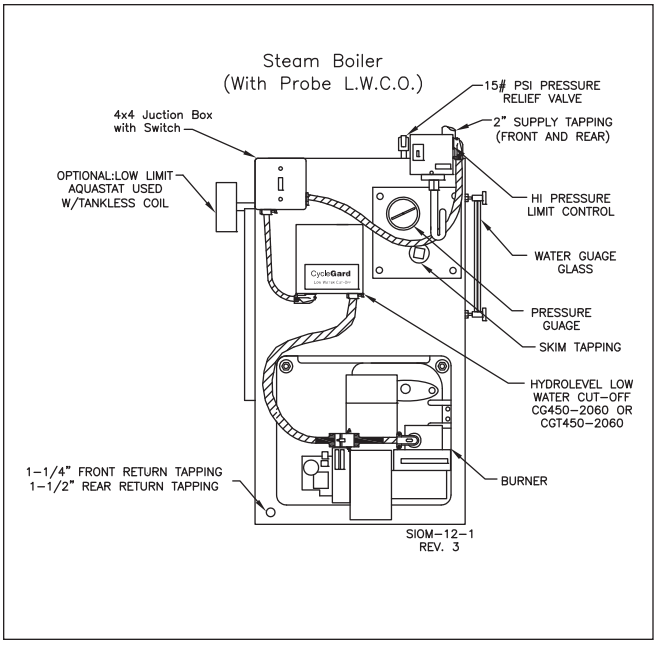


Figure No. 11 - Piping Connections Steam (3-5 Sections)

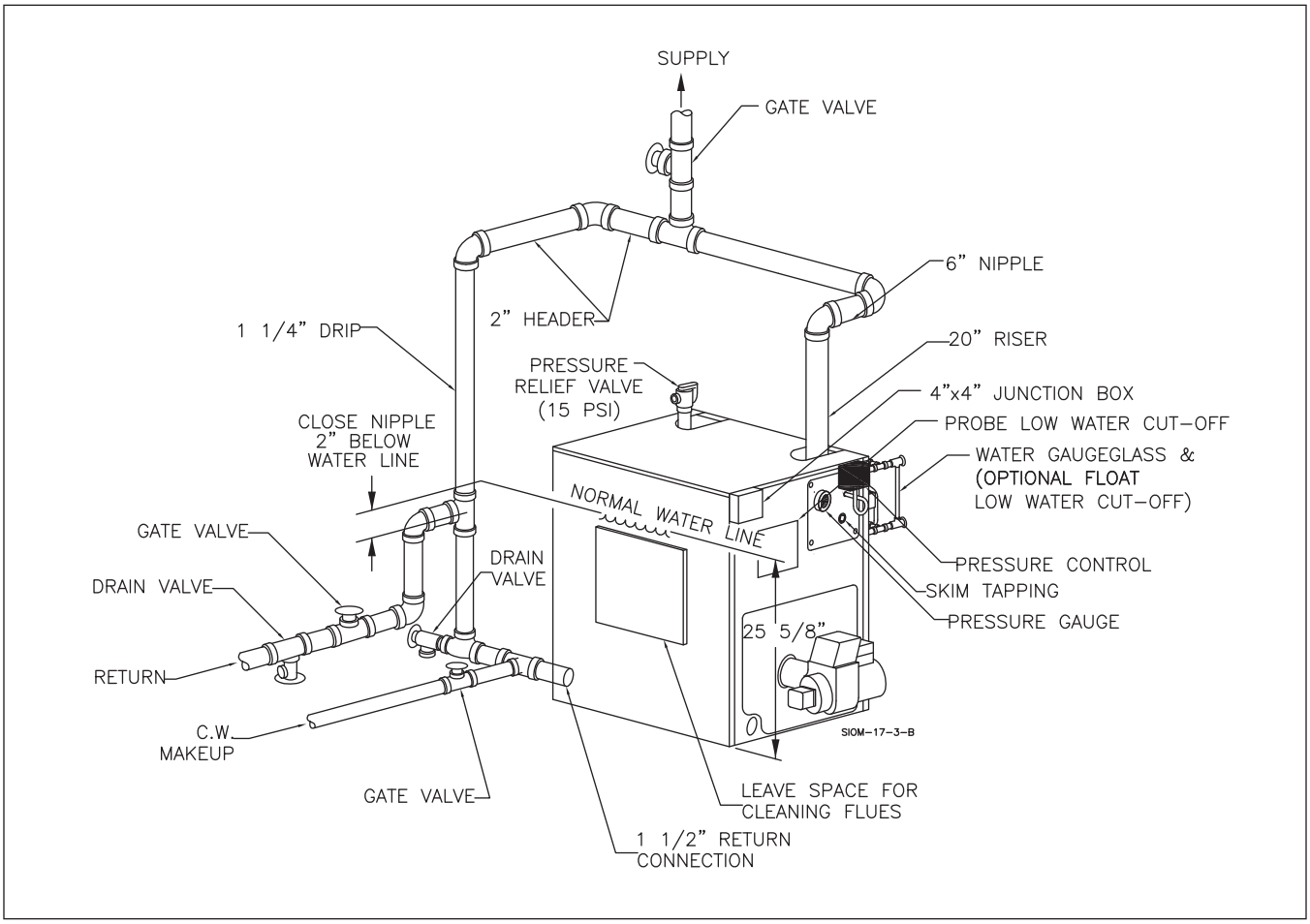
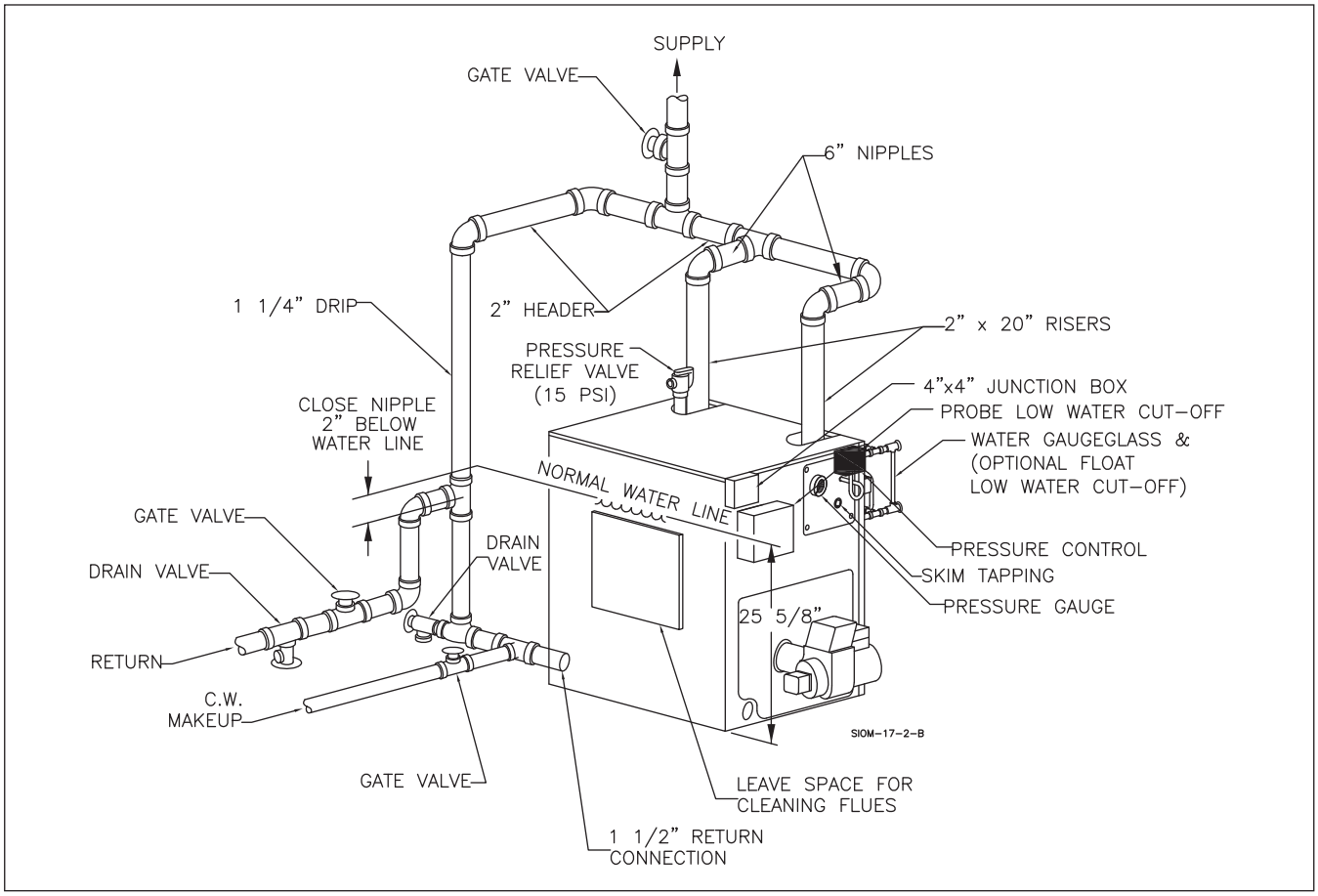


Figure No. 12 - Piping Connections Steam (6 Section)



OPERATING AND LIMIT CONTROLS

The steam boiler is furnished with a high limit pressure control and low water cutoff. If tankless hot water coil is furnished, a low limit temperature control is included and must be field wired. Recommended wiring diagrams for these boilers are illustrated in the separate electrical wiring diagram book.

Many jurisdictions require dual limit controls. The boiler installer must arrange to comply with local requirements by furnishing and installing any extra controls.

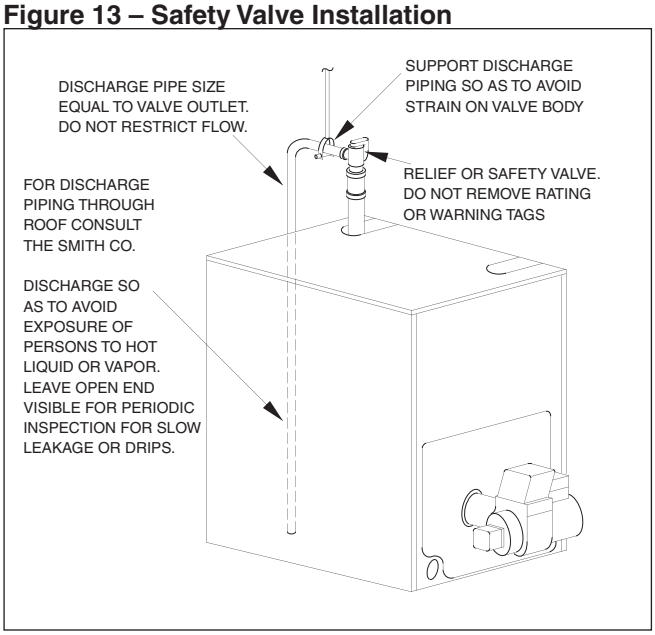
Safety Valve

Install safety valve (15 psi) in top 3/4" tapping of back section.

WARNING: Never install any type of valve between the safety valve and the boiler! Failure to comply with this warning can result in a boiler explosion causing extensive property damage, severe personal injury or death!

WARNING: The safety valve discharge piping must direct all water and vapor away from personnel. Failure to comply with this warning could result in severe personal injury!

Figure 13 – Safety Valve Installation


DISCHARGE PIPE SIZE EQUAL TO VALVE OUTLET. DO NOT RESTRICT FLOW.
SUPPORT DISCHARGE PIPING SO AS TO AVOID STRAIN ON VALVE BODY
RELIEF OR SAFETY VALVE. DO NOT REMOVE RATING OR WARNING TAGS
FOR DISCHARGE PIPING THROUGH ROOF CONSULT THE SMITH CO.
DISCHARGE SO AS TO AVOID EXPOSURE OF PERSONS TO HOT LIQUID OR VAPOR. LEAVE OPEN END VISIBLE FOR PERIODIC INSPECTION FOR SLOW LEAKAGE OR DRIPS.

PROBE LOW WATER CUT-OFF

Two different probe low water cut-offs are used on the PB Series steam boilers as standard equipment. The Hydrolevel model **CG450-2060** is used on models **without the tankless coil**, the **CGT450-2060** probe low water cut-off is used on models **with the tankless coil**. The probe low water cut-off senses water level by sending an electrical current through a metallic probe mounted in the water jacket of the boiler. If water is surrounding the probe the current will travel through the water to the metal casting and back to the control. The control will then enable the boiler to run. Hydrolevel recommends cleaning the probe yearly using a nylon-cleaning pad.

Hydrolevel has developed a "**CycleGuard**" feature that uses a timer to shut the boiler down at regular intervals for a "**still water test**". The still water test allows time for foam and condensate to settle before determining the true water level. This feature prevents foam and wave action from generating a false high water level. The Hydrolevel **CG450-2060** control is used on all PB Series steam boiler that are **not equipped with the tankless coil**. The 2060 suffix in the part number refers to the **CycleGuard** timing. This timing will allow the boiler to run for 20 minutes and then will provide a 60-second still water test. It is the **CycleGuard** feature, which in many situations is instrumental in protecting boilers during low water conditions. Foaming is the most difficult problem to overcome with a probe low water cut-off because it has the same electrical properties as water. Lab experience has shown that many boilers can have a severe foaming situation even though the sight glass remains still and crystal clear. To make matters worse, the generation of foam often increases as the water level drops and approaches the top of the crown sheet. The still water test cycle has a minimum effect on the boiler heating capacity. The boiler will resume a full rolling boil within 3 to 5 seconds of completing the still water test.

Water levels may fluctuate below the minimal safe level momentarily as a result of waves generated by the boiling action. There is a timer delay function programmed into the control that prevents the boiler from shutting off unless the low water condition lasts longer than 10-12 seconds. This allows enough time to eliminate nuisance shutdowns and yet the duration is short enough to prevent damage to the boiler in the event of a real low water condition.

The Hydrolevel control used on the PB Series steam boilers has another feature called the **SmartCycle**. This feature allows the timer to be reset at the start of each call for heat to provide a full 20 minute run time between still water testing. Without this option a boiler with a 2060 control timing that ran for 18 minutes on one call for heat will only run for 2 minutes on the next call for heat before shutting down for the still water test. This can appear to be a "boiler short cycling problem" when in fact the control timer is just finishing up the 20 minute cycle. The Hydrolevel control is constantly testing for low water even during standby when the boiler is idle. Testing is not limited to the still water test period. Therefore every call for heat essentially starts with a low water test. Through testing it was determined the PB Series boiler could run for 20 minutes without needing a still water test. To utilize this option an orange wire is connected from the burner to the Hydrolevel control at the "Burner" terminal. This wire sends a signal to the control each time the burner is energized resetting the **CycleGuard** timer. This allows the boiler to run a full 20 minute cycle on each call for heat, or until the call for heat is satisfied.

For steam boilers equipped **with a tankless coil** there is another **SmartCycle** feature that suspends the still water test until the demand for domestic hot water is satisfied. Normally after the still water test the boiler is back to a full boil in a few seconds, but cold water flowing through the tankless coil during this test period can cause the boiler water temperature to drop. On smaller boilers the burner output may not be enough to allow the water temperature to rebound and still produce domestic hot water. Steam boilers sold with the tankless coil are provided with a control with a "**T**" in the part number. The **CGT450-2060** control will have two extra pairs of terminals. There is a pair of terminals labeled "Low Limit". These terminals connect to an aquastat that measures the boiler water temperature near the tankless coil. The second set of terminals labeled "Thermostat" will connect to the T-T terminals on the burner in parallel with the building thermostat. This feature will suspend the still water test whenever the low limit aquastat determines that the boiler is being used to produce domestic hot water. This will help assure the boiler maintains sufficient temperature for the tankless coil to produce the hot water required.

FLOAT LOW WATER CUT-OFF

The float style low water cut-off is only offered as an option on PB Series boilers. This control consists of a float in a chamber that operates a switch. The chamber is plumbed to the boiler at the minimum safe water level. If the water drops below this level the float opens the switch and turns the burner off. If the switch has a second set of contacts a water feeder can be turned on to automatically refill the boiler to the minimum level. This control requires regular maintenance to assure reliability. It is recommended that the float low water cut-off gets “blown down” weekly to prevent the buildup of sediment. The blow down procedure consists of placing a bucket under the device and then opening the blow down valve located on the control while the boiler is under pressure. If the blow-down procedure is neglected sediment can build up under the float holding it at a high water position even though the water level has actually dropped to a dangerous level. The float low water cut-off can fail in a “run” condition when this happens leading to dry firing of the boiler. In this event the warranty will be voided. This device will require periodic disassembly for a more thorough cleaning and inspection. The mechanical switches will also need periodic replacing. Consult manufactures literature for recommendations on servicing.

CONSIDERATIONS WHEN USING AUTOMATIC WATER FEEDERS ON STEAM BOILERS

Every steam boiler at some time will need additional makeup water. Water levels need to be controlled on steam boilers to maintain correct steam-chest volume, prevent dry firing or flooding. Excessively low water levels can cause the iron to overheat creating a “dry fire “condition. The addition of excessive makeup water can cause the boiler to “flood” leading to a host of system problems and damage to personal property.

System leaks that cause a continual loss of water will require the constant addition of makeup water. Dissolved minerals and oxygen are introduced with makeup water and can severely reduce the life of a boiler. Dissolved oxygen in the water can cause internal corrosion of the cast iron leading to sludge formation and leaks. Mineral buildup in conjunction with sludge deposits can reduce the rate of heat transfer through the cast iron causing overheating and cracking, ultimately leading to boiler failure. Leaks must be repaired immediately to prevent this from happening.

The addition of an automatic water feeder can greatly reduce the number of nuisance lockouts due to low water conditions. When selecting a water feeder consideration should be given to preventing boiler flooding and the monitoring of water usage as well. A water feeder usually works in conjunction with the Low Water Cut-off by means of the alarm terminals. When the Low Water Cut-off turns off the boiler during a low water condition the alarm terminals are activated. These alarm terminals can be used to turn on the water feeder. The Hydrolevel CycleGard Low Water Cut-off has a 30 second delay between the time the probe detects water and when the alarm terminals are deactivated. If the water feed rate is too great the boiler can be flooded during this period. The Hydrolevel VXT-120 (120 Volt model) water feeder works well in conjunction with the CycleGard Low Water Cut-off. It has selection switches that are used to precisely meter the amount of water added, preventing boiler flooding. It is equipped with a digital counter that will monitor water usage. This feature can be used to detect increases in water consumption.

FILLING THE SYSTEM (STEAM)

Stable water level is a necessity for steam boilers. It is very important to have boiler water free from oil, grease, foaming materials etc. Therefore, flush the boiler thoroughly through a bottom drain by introducing clean water into the upper ports of all sections of the boiler. After the boiler piping connections are completed and the boiler can be fired, the boiler water should be heated up and surface impurities flushed off through a high connection (1-1/4" tapping provided in heater cover plate) (see Figures 11 and 12) and then drained through a bottom opening. The burner should not be operated with a low water level in the boiler and makeup water should not be introduced into a hot boiler.

If possible, the heating boiler should be operated for a time with all condensate returning from the system to a drain. This will remove impurities from the piping system which, if not removed early, will eventually enter the boiler and cause problems. In some instances, more than one cleaning will be required to obtain a stable water line.

Domestic Hot Water Heaters
Tankless domestic hot water heaters are avaialble for steam boiler applications.

Figure No. 14 - Tankless Heater

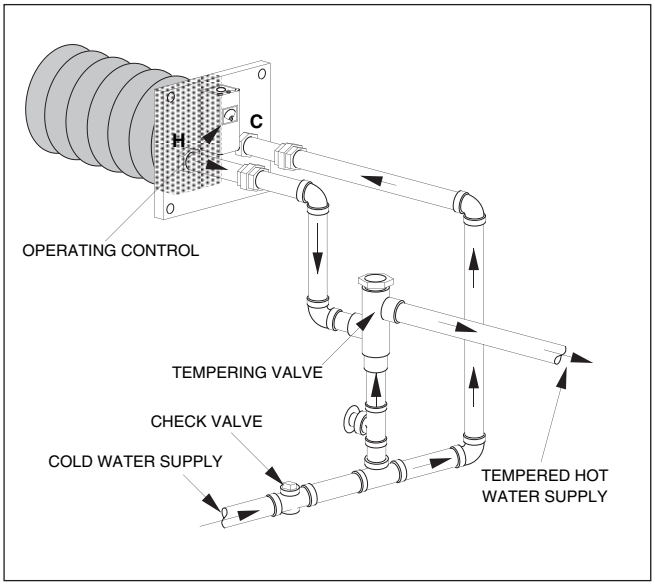


Table 2

DOMESTIC HOT WATER SUPPLY STEAM BOILER			
Model	**Firing Rate**	**Intermittent Draw (GPM)**	**Continuous Draw (GPM)**
PB-3	Low High	2.50 2.50	1.75 2.00
PB-4	Low High	3.30 3.50	2.50 2.90
PB-5	Low High	3.50 3.50	3.30 3.50
PB-6	Low High	3.50 3.50	3.50 3.50

STEAM BOILER MAINTENANCE

CAUTION: Servicing, inspection and adjustment must be done by a trained technician in accordance with all applicable local and national codes. Improper servicing or adjustment can damage the boiler!

The boiler must be cleaned and inspected at least once a year and before each heating season. Make sure that the burner and ignition components are free from dust, soot, dirt, corrosion or other deposits that would impair the boiler's performance.

Safety checks should include, but not limited to, the items listed in the PB Series Boiler Safety Checklist. This Safety Checklist is included at the end of the manual. A trained technician with a calibrated combustion analyzer should be hired to test and set up the oil burner to assure maximum safety and efficiency. Consult the manufacturer of each individual safety control for recommendations for service and adjustment.

IMPORTANT - These suggestions cover the boiler maintenance work which will result in the most efficient operation, the longest useful life of the boiler and the highest return on any investment necessary to carry out the maintenance work.

Steam

1. WATER LEVEL: Check regularly to be sure the boiler water level stays at the marked water line during operation under steam pressure. **DO NOT ADD WATER TO A HOT BOILER.** If water level is not visible in the gauge glass, allow the boiler to cool before adding makeup water. Locate the cause of low water and correct before starting operation.

2. LOW WATER CUTOFF: Check the burner cutoff switch to be certain the switch opens on water level drop below cutoff level.

3. PRESSURE CONTROL(S): Check regularly to be certain the pressure limit controls are functioning.

4. SAFETY VALVE: Conduct regular visual inspection of safety valve to detect signs of corrosive deposits, rust build-up or signs of weeping. It should not weep or discharge water at normal system pressure. NEVER try to clean or repair the relief valve! If the valve fails replace it! Replace the valve with a new valve of proper capacity and pressure setting if defective.

5. GAUGE GLASS: When rust, suspended solids, etc. appear in the gauge glass, blowdown may be necessary. Blowdown should be limited only as necessary to remove sediment from the boiler waterways. Foaming, fluctuating water line, steam hammer are signs pointing to the need for blowdown.

Heating Surface Cleaning

WARNING: Failure to disconnect all electrical power to the boiler before cleaning it could result in a fire or severe personal burn injuries!

WARNING: Never attempt to operate the boiler with the cleanout cover plates removed! Failure to comply with this warning can result in a fire which could cause extensive property damage, severe personal injury or death!

Disconnect all electrical power to the boiler before proceeding. Remove the cleanout cover access panel from the left side of the boiler. Remove the cleanout cover(s) taking care not to damage the insulation between the cover(s) and the boiler. Use a wire brush to thoroughly clean the fireside surfaces. For the best results, start brushing from the top and work down toward the combustion chamber. Disconnect the flue pipe and inspect it and the smoke hood for soot build up. Clean them thoroughly before reconnecting them. Open the cleanout door on the right side of the burner mounting plate. Carefully vacuum any soot or scale from the bottom of the combustion chamber. Do not contact the ceramic blanket in the bottom of the combustion chamber or it will be damaged.

IMPORTANT - If the ceramic blanket is damaged it must be replaced! Failure to replace a damaged ceramic blanket can result in the failure of the cast iron sections!

Inspect the cleanout door gasket and insulation and replace them if damaged. Close the cleanout door and tighten it into place. Inspect the cleanout cover insulation and replace it if damaged. **It is important to maintain the integrity of the gas seal by careful installation of the cleanout cover plate. Be sure there is no opening to allow gases to escape.** Install the cleanout cover(s) and tighten into place. Install the cleanout cover access panel. Restore electrical power to the boiler and ensure that it operates properly.

Chimney and Smoke Pipe

Be sure that the chimney and smoke pipe do not become obstructed by birds nests, squirrels, soot, chimney liner deterioration, or other debris. Keep chimney cleanout doors closed and sealed tight around the frames. Be sure the smoke pipe is inserted only at the nearest chimney liner surface and seal around the pipe with insulating cement.

WARNING: Be sure that no combustible materials are stored close to the boiler or smoke pipe. Fires can cause personal injury and property damage.

PB SERIES WIRING

The PB Series boiler comes pre-wired with factory harnesses that connect the safety control system. These boilers are equipped with a harness system utilizing a 6-pin electrical connector that joins the boiler to the burner. Burners from Carlin, Beckett and Riello can be connected to both steam and water boilers utilizing this connector. The harness system is designed to make burner replacement and routine servicing quicker and safer to perform. The high limit control system on this boiler is 120 VAC power. Only trained technicians should attempt to troubleshoot or repair the control system. All power should be turned off before attempting any service work.

When troubleshooting the electrical system on an PB Series boiler it is only necessary to check the wires that apply to the specific burner and boiler combination being used. There may be wires in the harness that are not used for the particular application at hand. These wires have been included to allow for all the various combinations of boiler and burner choices. **Consult the Electrical Wiring Book shipped with each boiler for details.**

Special Boiler Harness Requirements

On each boiler there are two harnesses with a 6-pin connector -- the “Boiler Harness”, which is provided by the factory, and the “Burner Harness”, provided by the burner manufacturer. The factory manufactures two different “Boiler Harnesses”:

1. The “Water” harness is primarily used on water boilers but is also found on steam boilers with the optional Float Low Water Cut-off. It runs from the junction box directly to the burner (Part #79004).

2. The “Steam” harness is only used for the steam boiler with the Probe Low Water Cut-off. This harness is shorter and has an additional ORANGE wire used to signal the Cycle Guard timer to reset at the beginning of the call for heat. (See the steam boiler section on the Probe Low Water Cut-off for a description of the Cycle Guard feature). The steam harness runs from the Low Water Cut-off to the burner (Part #79002).

Both boiler harnesses have a RED wire that provides a constant 120V power supply used by the Carlin and Riello burners. This RED wire is always provided, but not used, on boilers equipped with the Beckett burner. The Beckett “Burner Harness will not have a red wire or corresponding pin in the connector.

Special Burner Harness Requirements

All of the Burner Harnesses will have an ORANGE wire. At the time of shipping it is not known if the burner will be firing a steam or water boiler. On all water boilers the ORANGE wire is not required and will terminate in the "Burner Harness" connector with no corresponding pin or wire in the "Boiler Harness" connector.

The "Burner Harnesses" on the Carlin and Riello burners have a RED wire not found on the Beckett harness. The Carlin 60200 control offers a post-purge feature that cleanses combustion byproducts after the call for heat is satisfied. A constant supply of power must be provided to run the blower motor for the post-purge feature. A similar power requirement is found with the Riello burner. The Riello burner is equipped with an electric shutter that requires constant power for closing after the call for heat has been satisfied. The Beckett "Burner Harness" does not have the red wire because the GeniSys control that is used does not have a post-purge feature, and the burner does not have an electric shutter.

Table 3 - Wire Color Designation

Wire Color	Designation
Red	Constant Power
Black	Safety Limits
White	Neutral
Green	Chassis Ground
Orange	Low Water Cut-Off Reset
Yellow	Circulator Hot

Note: When adding field wiring or if any wire needs to be replaced use #18AWG MTW wire rated for 105°C and 600V.

WIRE HARNESSES

Figure No. 15

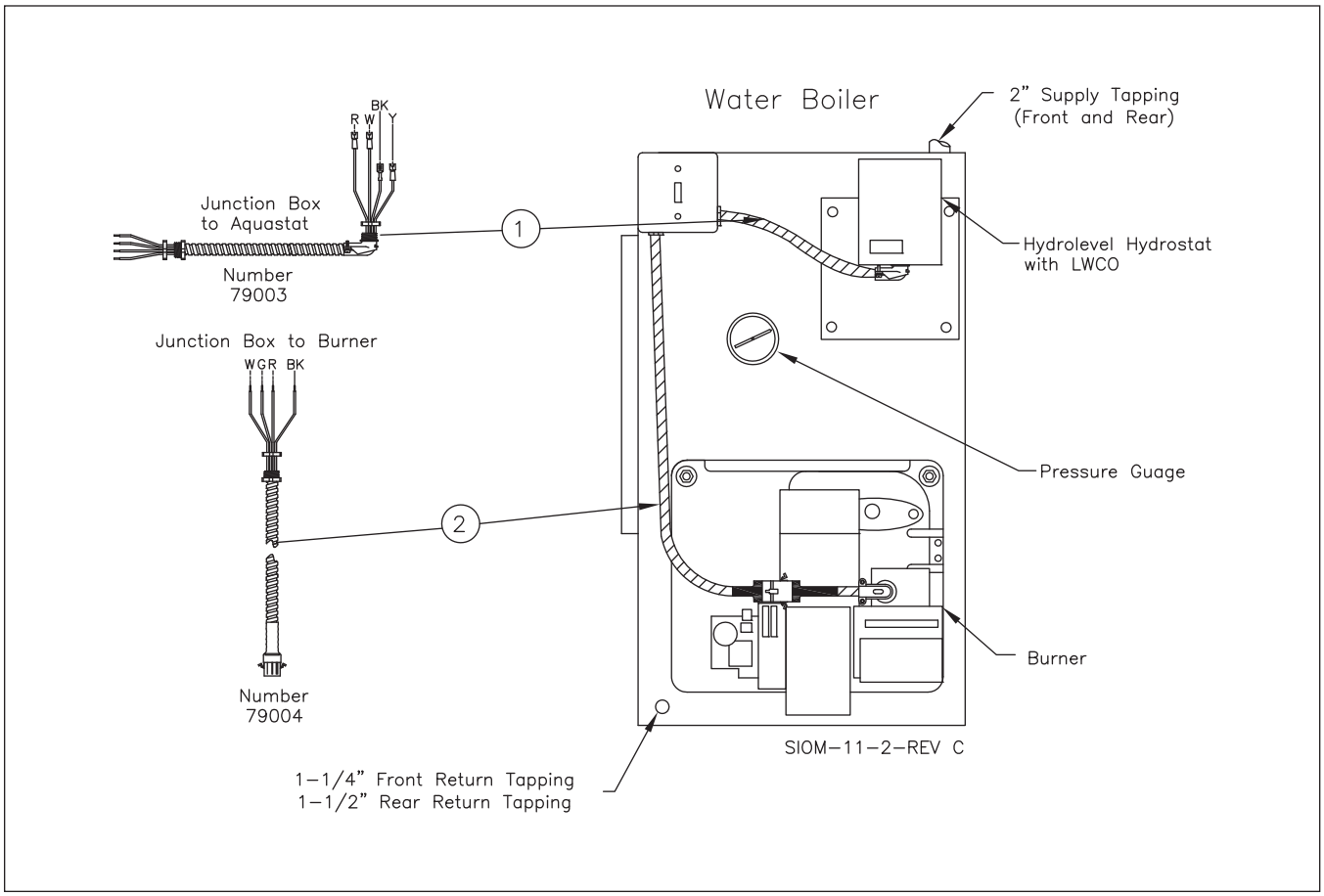


Figure No. 16

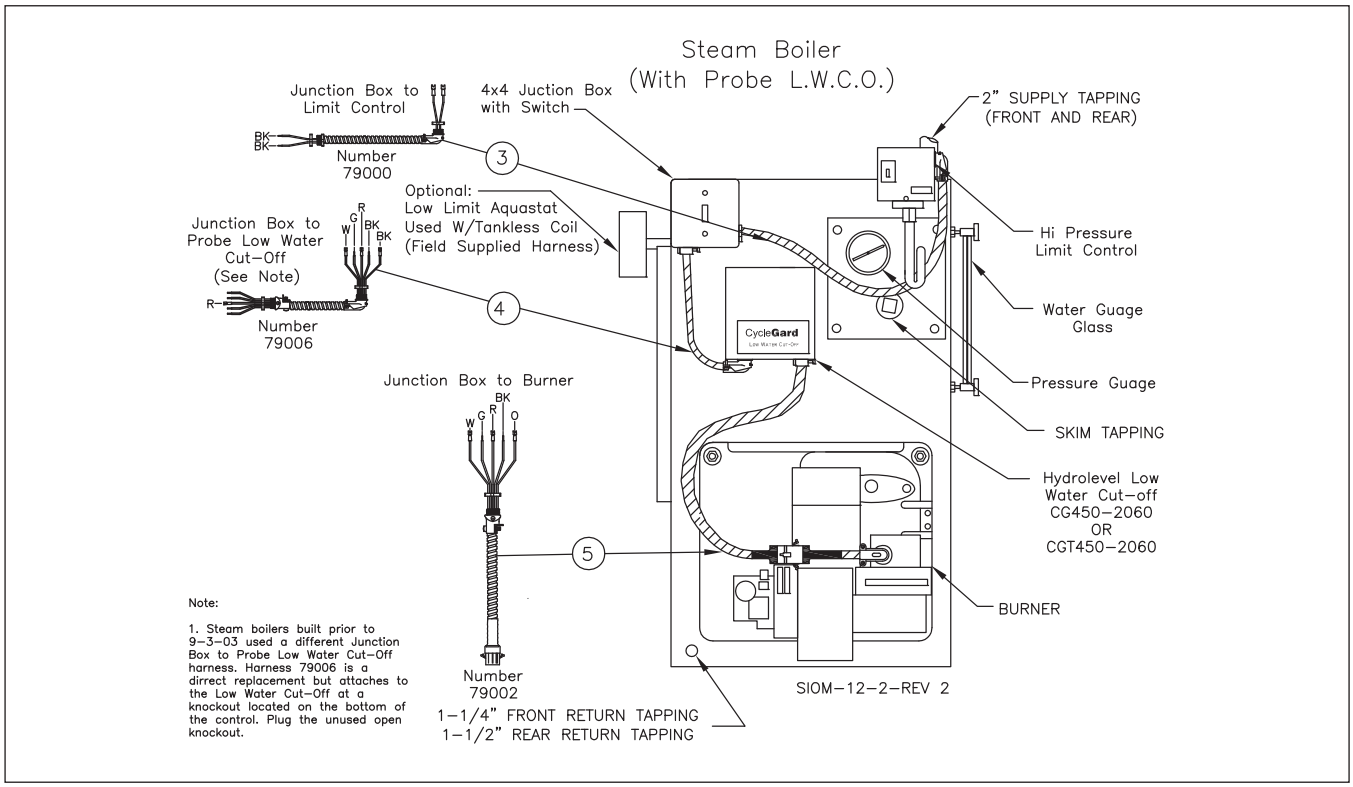
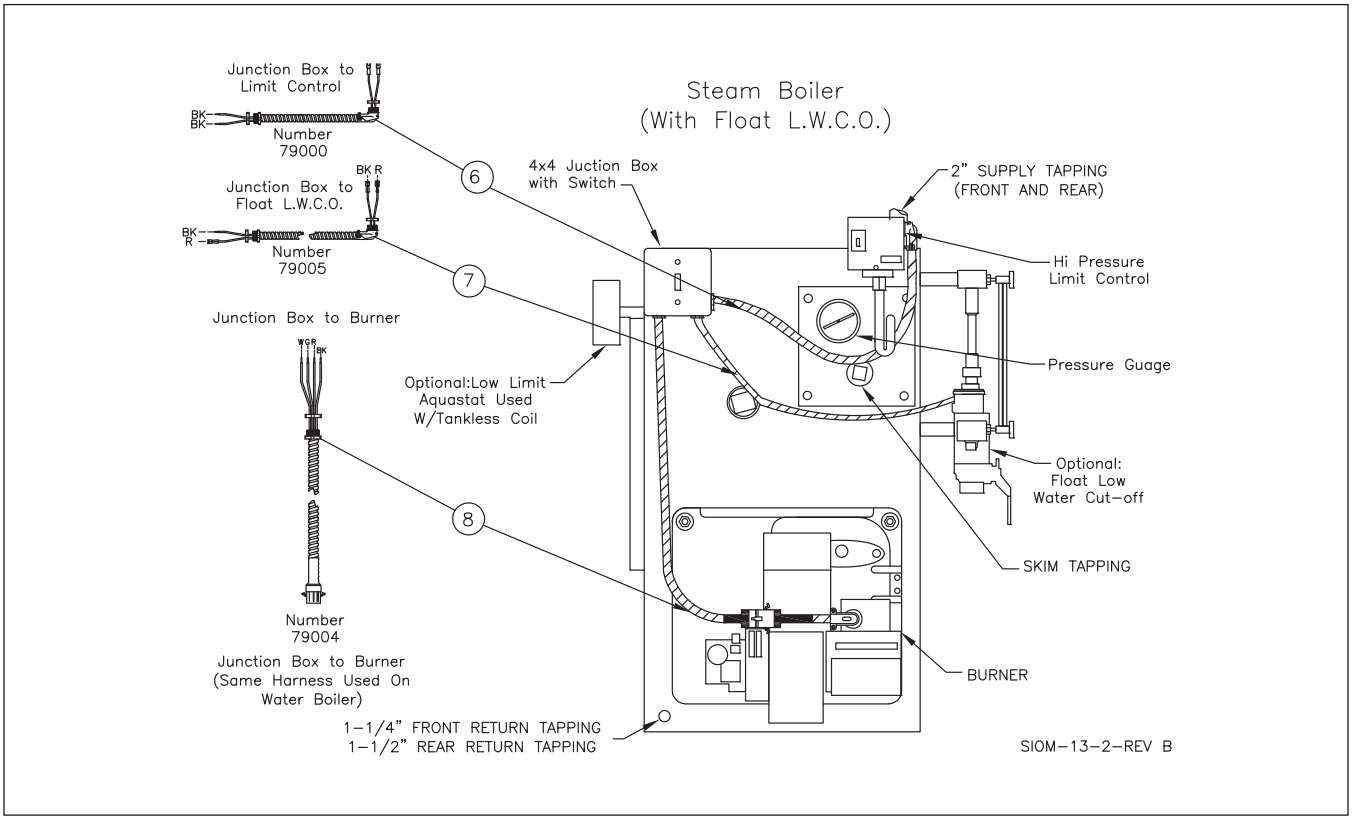
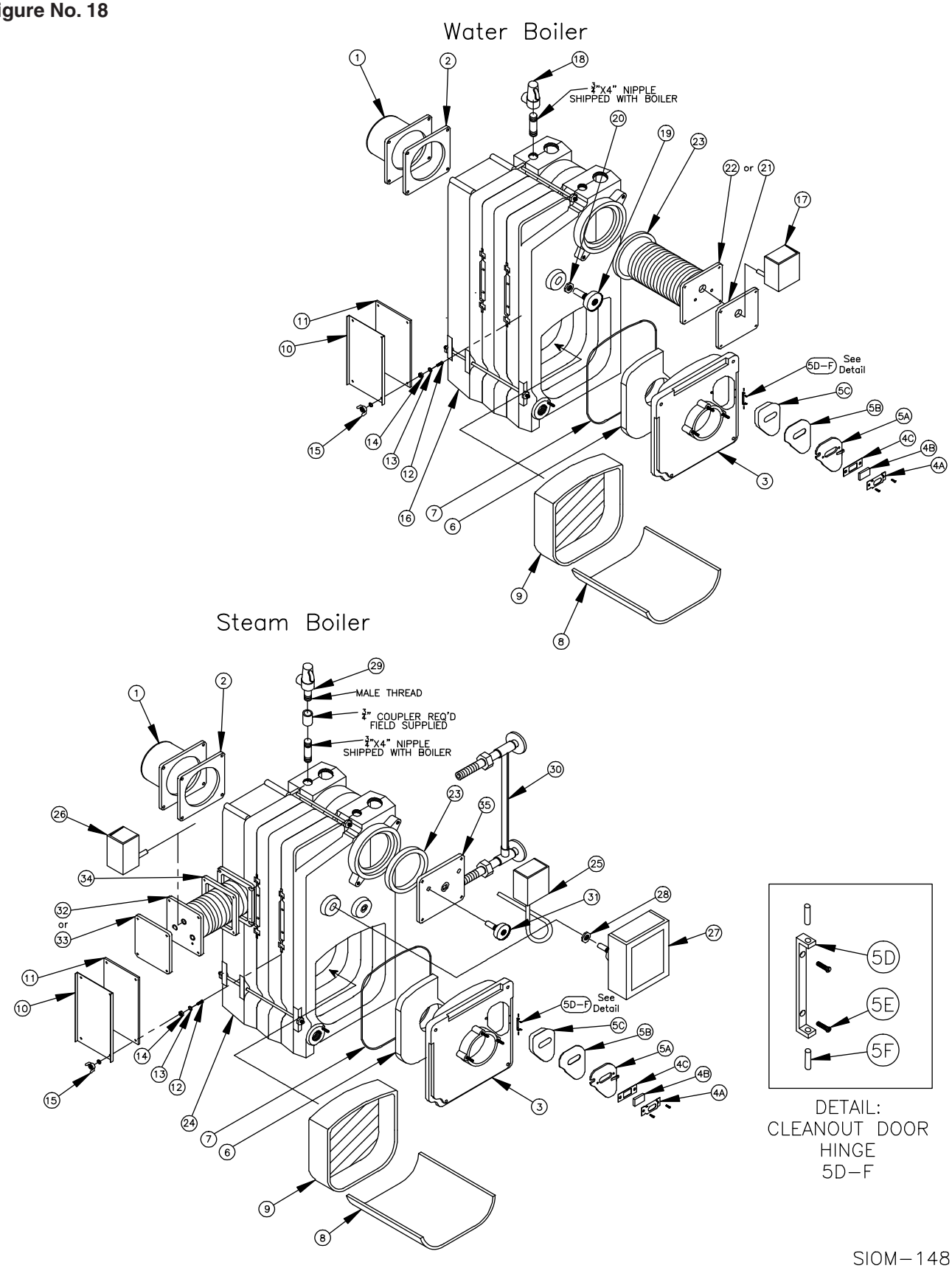


Figure No. 17



WATER AND STEAM REPLACEMENT PARTS

Figure No. 18



WATER AND STEAM BOILER PARTS LIST

Table 4 - Boiler Parts

Ref #	Name of Part	Part No.	BOILER MODEL			
			PB105/120	PB150/180	PB200/235	PB245/295
1	6" Smokehood w/Gasket & Screws	01-3668	1	1		
	7" Smokehood w/Gasket & Screws	01-3545			1	1
2	Smokehood Gasket	59-1041	1	1	1	1
—	Draft Plug	61518S				
—	Smokehood Mounting Screws (5/16")	61772	4	4	4	4
3 - 5	Burner Mounting Plate Complete Assy	BM-9860	1	1	1	1
4A	Sight Glass Holder	59472	1	1	1	1
4B	Sight Glass	59471	1	1	1	1
4C	Sight Glass Gasket	BM-9857	1	1	1	1
—	Sight Glass Screw	61757	2	2	2	2
5A	Cleanout Door	01-3665	1	1	1	1
5B	Cleanout Door Gasket	BM-9858	1	1	1	1
5C	Cleanout Door Insulation	BM-9859	1	1	1	1
5D	Cleanout Door Hinge	03-8463	1	1	1	1
5E	Cleanout Door Hinge Screws	60820	2	2	2	2
5F	Cleanout Door Roll Pin	60833	2	2	2	2
6	Insulation Block	10-5031	1	1	1	1
7	Wicking 1/4" (4 ft Req'd)	10-5024	1	1	1	1
8	Floor Insulation Blanket	10-5025	1			
		10-5026		1		
		10-5027			1	
		10-5028				1
9	Target Wall	45-1254	1	1	1	1
10	Cleanout Cover Plate 14" x 8"	03-8438	1		2	1
	Cleanout Cover Plate 14" x 12-1/2"	03-8439		1		1
11	Cleanout Cover Plate Insul 14" x 8"	10-5029	1		2	1
	Cleanout Cover Plate Insul 14" x 12-1/2"	10-5030		1		1
12	Cleanout Cover Bolt (5/16")	60020	4	4	8	8
13	Cleanout Cover Washers (5/16")	57-4609	8	8	16	16
14	Cleanout Cover Wing Nut (5/16")	57-5419	4	4	4	4
15	Cleanout Cover Jam Nut (5/16")	60871S	4	4	8	8

Table 4 - Boiler Parts *continued*

Ref #	Name of Part	Part No.	BOILER MODEL			
			PB105/120	PB150/180	PB200/235	PB245/295
	Water Boiler Parts					
—	Complete Jacket	BM-2046	1			
		BM-2047		1		
		BM-2048			1	
		BM-2049				1
16	Water Block	BM-2050	1			
		BM-2051		1		
		BM-2052			1	
		BM-2053				1
17	Hydrolevel Aquastat/LWCO	14-0009	1	1	1	1
	Hydrolevel Electrostatic Well for LWCO	14-0008	1	1	1	1
18	Relief Valve 30# (Water, Female Thread)	22-1203	1	1	1	1
19	Temp & Pressure Gauge	20-1019	1	1	1	1
20	Bushing 1" X 1-1/4"	61161S	1	1	1	1
21	Heater Cover Plate	01-3667	1	1	1	1
22	Tankless Heater, Water (3.5 GPM)	05-1578	1	1		
	Tankless Heater, Water (5.0 GPM)	05-1579			1	1
23	Heater Plate Gasket EPDM (Water & Steam)	60248S	1	1	1	1
	Steam Boiler Parts					
—	Complete Jacket	BM-2054	1			
		BM-2055		1		
		BM-2056			1	
		BM-2057				1
24	Universal Block	BM-2042	1			
		BM-2043		1		
		BM-2044			1	
		BM-2045				1
25	Steam Pressuretrol PA404A	02-4807	1	1	1	1
26	Tankless Ctrl L4007	02-3923	1	1	1	1
27	LWCO Less Tankless: CG450-20/60	50086	1	1	1	1
	LWCO With Tankless: CGT450-20/60	50087	1	1	1	1
—	Optional: #67 LWCO	21-2060	1	1	1	1
28	Bushing, 1" x 1-1/4"	61161S	1	1	1	1
29	Relief Valve 15# (Steam, Male Thread)	22-1204	1	1	1	1
30	Gauge Glass Set	20-2010	1	1	1	1
31	Steam Gauge	20-2011	1	1	1	1
32	Tankless Heater (3.5 GPM)	05-1580	1	1	1	1
33	Heater Plate Steam Back	03-8462	1	1	1	1
34	Heater Plate Gasket	59-1040	1	1	1	1
35	Heater Cover Plate w/Skim Tapping	01-3579	1	1	1	1

PB SERIES BOILER – SAFETY CHECKLIST

BOILER FIRESIDES MUST BE CLEANED AT LEAST ANNUALLY

The following safety checks must be made at initial start-up and on an annual basis thereafter:

High Limit Operation	_____	Set at	_____
Operating Limit Operation	_____	Set at	_____
Low Water Cutoff	_____		
Backup Low Water Cutoff	_____		
Service Switches	_____		
All additional limits	_____		
Safety Valve Capacity*	_____		
Burner Motor Amps	_____		
Flame Failure	_____		
CO_2	_____		
Smoke	_____		
Draft in Smokehood	_____		
Draft Overfire**	_____		
Stack Temperature	_____		
Efficiency	_____		
Combustion Makeup Air***	_____		

* Safety valve capacity must be at least equal output of boiler.

** Draft should be adjusted to -0.02" WC, if possible. Overfire draft should not be over 0.05" negative pressure.

*** There must be at least 15 sq. in. of free area per gallon of oil burned. When louvers are used, double the figure listed above.

In absence of local codes NFPA 31 “Installation of Oil Burning Equipment” should be followed.

Proper operating and safety instructions must be given to boiler operator.

BURNER SPECIFICATIONS

Table 5

Carlin

Boiler Model	Burner Capacity (GPH)	Burner Input (MBH)	Burner Model	Nozzle Type	Pump Pressure (PSI)	Slide Bar Or Head Position	Air Setting
PB-3L	.75	105	EZ-1 HP	.65 70A Delavan	150	.60-.65	.65
PB-3H	.95	133	EZ-1 HP	.75 70B Delavan	150	.75	.75
PB-4L	1.10	154	EZ-1 HP	.85 60B Delavan	150	.85-1.00	.85
PB-4H	1.25	175	EZ-1 HP	1.00 60B Delavan	150	.85-1.00	1.00
PB-5L	1.40	196	EZ-1 HP	1.10 60B Delavan	150	1.10-1.25	1.10
PB-5H	1.70	238	EZ-1 HP	1.25 60B Delavan	150	1.10-1.25	1.25
PB-6L	1.75	245	99 FRD	1.75 60R Monarch	100	5	70%
PB-6H	2.10	294	99 FRD	2.10 60R Monarch	100	6	100%

Beckett

Boiler Model	Burner Capacity (GPH)	Burner Input (MBH)	Burner Model	Nozzle Type	Pump Pressure PSI	Air Shutter	Air Band	Ret. Head
PB-3L	.75	105	AFG	0.65 80A Delavan	140	9	2	F3
PB-3H	.95	133	AFG	0.75 80A Delavan	140	10	4	F3
PB-4L	1.10	154	AFG	0.85 80A Delavan	140	9	0	F6
PB-4H	1.25	175	AFG	1.00 80A Delavan	140	10	1	F6
PB-5L	1.40	196	AFG	1.10 80A Delavan	140	10	2	F6
PB-5H	1.70	238	AFG	1.35 80B Delavan	140	10	4	F12
PB-6L	1.75	245	AFG	1.50 80B Delavan	140	10	3	F12
PB-6H	2.10	294	AFG	1.65 80B Delavan	140	10	4	F16

Reillo 40 Series Oil Burners

Boiler Model	Burner Capacity (GPH)	Burner Input (MBH)	Reillo Burner Model	Nozzle Type	Pump Pressure PSI	Turbulator Setting	Air Gate Setting
PB-3L	.75	105	F3	0.60 60W Delavan	160	1.5	2.7
PB-3M	.85	119	F3	0.65 60W Delavan	160	3.0	2.7
PB-3H	.95	133	F3	0.75 60W Delavan	160	3.0	2.7
PB-4L	1.10	154	F5	0.85 60W Delavan	150	1.0	3.4
PB-4H	1.25	175	F5	1.00 60W Delavan	150	1.5	4.0
PB-5L	1.40	196	F5	1.20 60W Delavan	150	2.0	2.5
PB-5H	1.70	238	F10	1.35 60W Delavan	145	1.0	3.0
PB-6L	1.75	245	F10	1.35 60W Delavan	145	1.0	3.0
PB-6H	2.10	294	F10	1.50 60W Delavan	145	3.0	3.0

Notes
All the burner settings listed are approximate. Every burner should be tuned with instruments by a trained technician. CO^2 should be 11 1/2 - 13 1/2% with "0" smoke. The overfire draft should be -.02 to -.05. If the overfire draft exceeds -.05 a single acting barometric should be used.

Beckett Burners: All are equiped with **F** style combustion heads. A 3-3/8" **Static Plate** is installed on all burner sizes except 6H. A **Low Firing Rate Baffle** is installed only on 3L, 3H burners.

Riello: An **ST** Air Tube Combo is used on all models. The insertion depth is 3-3/4".

WARNING

Any appliance that burns natural gas, propane gas, fuel oil, wood or coal is capable of producing carbon monoxide (CO).

Carbon Monoxide (CO) is a gas which is odorless, colorless and tasteless but is very toxic.

If your Hydrotherm boiler is not working properly, or is not vented properly, dangerous levels of CO may accumulate. CO is lighter than air and thus may travel throughout the building. **BRIEF EXPOSURE TO HIGH CONCENTRATIONS OF CO, OR PROLONGED EXPOSURE TO LESSER AMOUNTS OF CO MAY RESULT IN CARBON MONOXIDE POISONING.**

EXPOSURE CAN BE FATAL AND EXPOSURE TO HIGH CONCENTRATIONS MAY RESULT IN THE SUDDEN ONSET OF SYMPTOMS INCLUDING UNCONSCIOUSNESS.

Symptoms of CO poisoning include the following:

dizziness	vision problems	shortness of breath
headaches	loss of muscle control	unclear thinking
nausea	weakness	unconsciousness

The symptoms of CO poisoning are often confused with those of influenza, and the highest incidence of poisoning occurs at the onset of cold weather or during flu season. A victim may not experience any symptoms, only one symptom, or a few symptoms. Suspect the presence of carbon monoxide if symptoms tend to disappear when you leave your home.

The following signs may indicate the presence of carbon monoxide:

- Hot gases from appliance, venting system, pipes or chimney, escaping into the living space.
- Flames coming out around the appliance.
- Yellow colored flames in the appliance.
- Stale or smelly air.
- The presence of soot or carbon in or around the appliance.
- Very high unexplained humidity inside the building.

If any of the symptoms of CO poisoning occur, or if any of the signs of carbon monoxide are present, **VACATE THE PREMISES IMMEDIATELY AND CONTACT A QUALIFIED HEATING SERVICE COMPANY OR THE GAS COMPANY OR THE FIRE DEPARTMENT.**

To reduce the risk of CO poisoning, have your heating system “tuned up” by a licensed heating contractor or the gas company - preferably before each heating season. Also have the service company check your chimney or vent pipes for blockage.

Your home should also be adequately ventilated, particularly if you have insulated your home.

ONLY QUALIFIED, LICENSED SERVICE CONTRACTORS SHOULD PERFORM WORK ON YOUR HYDROTHERM BOILER!

WARNING

Install, operate and maintain unit in accordance with manufacturer’s instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The State of California has determined that these substances may cause cancer, birth defects, or other reproductive harm. Also, install and service this product to avoid exposure to airborne particles of glasswool fibers and/or ceramic fibers known to the State of California to cause cancer through inhalation.

LIFETIME LIMITED WARRANTY
Residential Cast Iron Water Boilers

First Through Tenth Year
The "Manufacturer" warrants to the original owner at the original installation site that the cast iron sections of the Residential Cast Iron Water Boilers (the "Product") will be free from defects in material or workmanship for ten (10) years from the date of installation. If upon examination by the Manufacturer the Product is shown to have a defect in material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the Product which is shown to be defective.

Eleventh Year and Above
The Manufacturer warrants that the cast iron sections of its residential cast iron water boilers will remain free of defects in material or workmanship under normal usage for the lifetime of the original owner at the original installation site. Should any sections be found to be defective, the Manufacturer will repair or replace, at its option, the original cast iron sections upon the payment of a proportionate charge based on the time the defective section was in service. The proportionate charge will be equal to the appropriate percentage of the trade price of the section at the time the warranty claim is made, determined as follows:

Year	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25 & Above
% of Trade Price	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75

This limited warranty does not apply:
(a) if the Product has been subjected to misuse or neglect, has been accidentally or intentionally damaged, has not been installed, maintained or operated in accordance with the furnished written instructions, or has been altered or modified in any way.
(b) to any expenses, including labor or material, incurred during removal or reinstallation of the Product or parts thereof.
(c) to any other cast iron parts of the boiler.
(d) to burners, jackets, controls, and other auxiliary equipment furnished by the Manufacturer, but manufactured by others. Any warranties for such items shall be limited to those warranties offered by the original equipment manufacturer.
(e) to damage as a result of settlement, distortion, collapse, or cracking of any foundation area, beams or pipes surrounding the Product.
(f) to any workmanship of any installer of the Product; or to Products installed outside the continental United States or Canada.

This limited warranty is conditional upon:
(a) shipment, to the Manufacturer, of that part of the Product thought to be defective. Goods can only be returned with prior written approval from the Manufacturer. All returns must be freight prepaid.
(b) determination, in the reasonable opinion of the Manufacturer, that there exists a defect in material or workmanship
(c) the residential water boiler having been installed in a single–family or two–family residential dwelling.

Repair or replacement of any part under this Limited Warranty shall not extend the duration of the warranty with respect to such repaired or replaced part beyond the stated warranty period.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ALL SUCH OTHER WARRANTIES, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS LIMITED WARRANTY. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE IN ANY WAY FOR ANY CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OF ANY NATURE WHATSOEVER, OR FOR ANY AMOUNTS IN EXCESS OF THE SELLING PRICE OF THE PRODUCT OR ANY PARTS THEREOF FOUND TO BE DEFECTIVE. THIS LIMITED WARRANTY GIVES THE ORIGINAL OWNER OF THE PRODUCT SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY BY EACH JURISDICTION.

HydroTherm®

LIMITED WARRANTY
Residential Cast Iron Steam Boilers

One Year Warranty
The "Manufacturer" warrants to the original owner at the original installation site that the Residential Cast Iron Steam Boiler (the "Product") will be free from defects in material or workmanship for one (1) year from date of installation. If upon examination by the Manufacturer the Product is shown to have a defect in material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the Product which is shown to be defective.

Ten Year Warranty
The Manufacturer further warrants to the original owner at the original installation site that the Product's cast iron sections will be free from defects in material or workmanship for ten (10) years from the date of shipment from the factory. If upon examination by the Manufacturer a cast iron section is shown to have a defect in material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the Product which is shown to be defective.

This limited warranty does not apply:
(a) if the Product has been subjected to misuse or neglect, has been accidentally or intentionally damaged, has not been installed, maintained or operated in accordance with the furnished written instructions, or has been altered or modified in any way.
(b) to any expenses, including labor or material, incurred during removal or reinstallation of the Product or parts thereof.
(c) to any other cast iron parts of the boiler.
(d) to burners, jackets, controls, and other auxiliary equipment furnished by the Manufacturer, but manufactured by others. Any warranties for such items shall be limited to those warranties offered by the original equipment manufacturer.
(e) to damage as a result of settlement, distortion, collapse, or cracking of any foundation area, beams or pipes surrounding the Product.
(f) to any workmanship of any installer of the Product; or to Products installed outside the continental United States or Canada.

This limited warranty is conditional upon:
(a) shipment, to the Manufacturer, of that part of the Product thought to be defective. Goods may only be returned with the prior written approval of the Manufacturer. All returns must be freight prepaid.
(b) determination in the reasonable opinion of the Manufacturer that there exists a defect in material or workmanship.

Repair or replacement of any part under this Limited Warranty shall not extend the duration of the warranty with respect to such repaired or replaced part beyond the stated warranty period.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ALL SUCH OTHER WARRANTIES, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS LIMITED WARRANTY. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE IN ANY WAY FOR ANY CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OF ANY NATURE WHATSOEVER, OR FOR ANY AMOUNTS IN EXCESS OF THE SELLING PRICE OF THE PRODUCT OR ANY PARTS THEREOF FOUND TO BE DEFECTIVE. THIS LIMITED WARRANTY GIVES OWNER OF THE INSTALLATION SITE SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY BY EACH JURISDICTION.

HydroTherm®

HydroTherm®

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